

NOTES:

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).
4. EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
5. ROCK SUPPORT MEASURES NOT SHOWN.
6. ROCK DRAINAGE SYSTEM WITH SYSTEMATIC DRAIN HOLES NOT SHOWN.
7. CRANE BEAM WITH SYSTEMATIC ROCKBOLT ANCHORING AS PER REQUIREMENT OF STRUCTURAL ANALYSIS.

DRAFT STATUS:
06.10.2018

LEGEND:

- CONCRETE CLASS A – BACKFILL CONCRETE C20/25
- CONCRETE CLASS C1 – FIRST STAGE CONCRETE C25/30
- CONCRETE CLASS C2 – FIRST STAGE CONCRETE C30/37
- CONCRETE CLASS C1 – SECOND STAGE CONCRETE C25/30
- CONCRETE CLASS F – BLINDING CONCRETE C12/15

CONSTRUCTION JOINTS

CHEQUERED PLATES

UNFINISHED TOP OF SLAB

FINISHED FLOOR LEVEL

FIXPOINT-COORDINATE

NUMBER OF EL-ME EQUIPMENT REFER TO LIST OF EQUIPMENT

ROOM NUMBER

SCALE
-2 0 2 4 6 8 10 [m]
1:200

Reference Drawings

Drwg. No.	Title
31-00053-DD-4336-Q-1350	US VALVE CHAMBER, LAYOUT, SECTIONS

Revisions	Name	Date	Notes



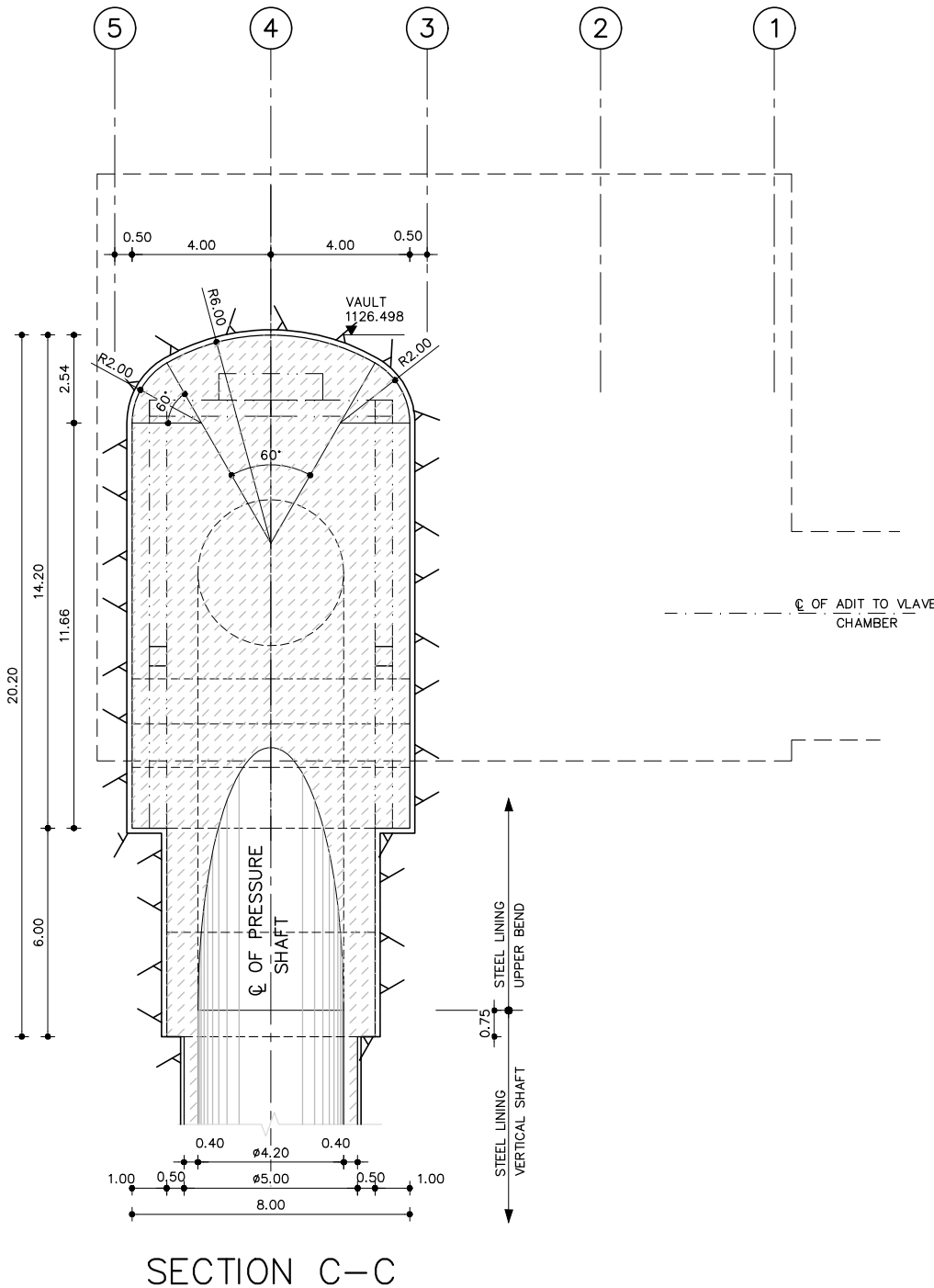
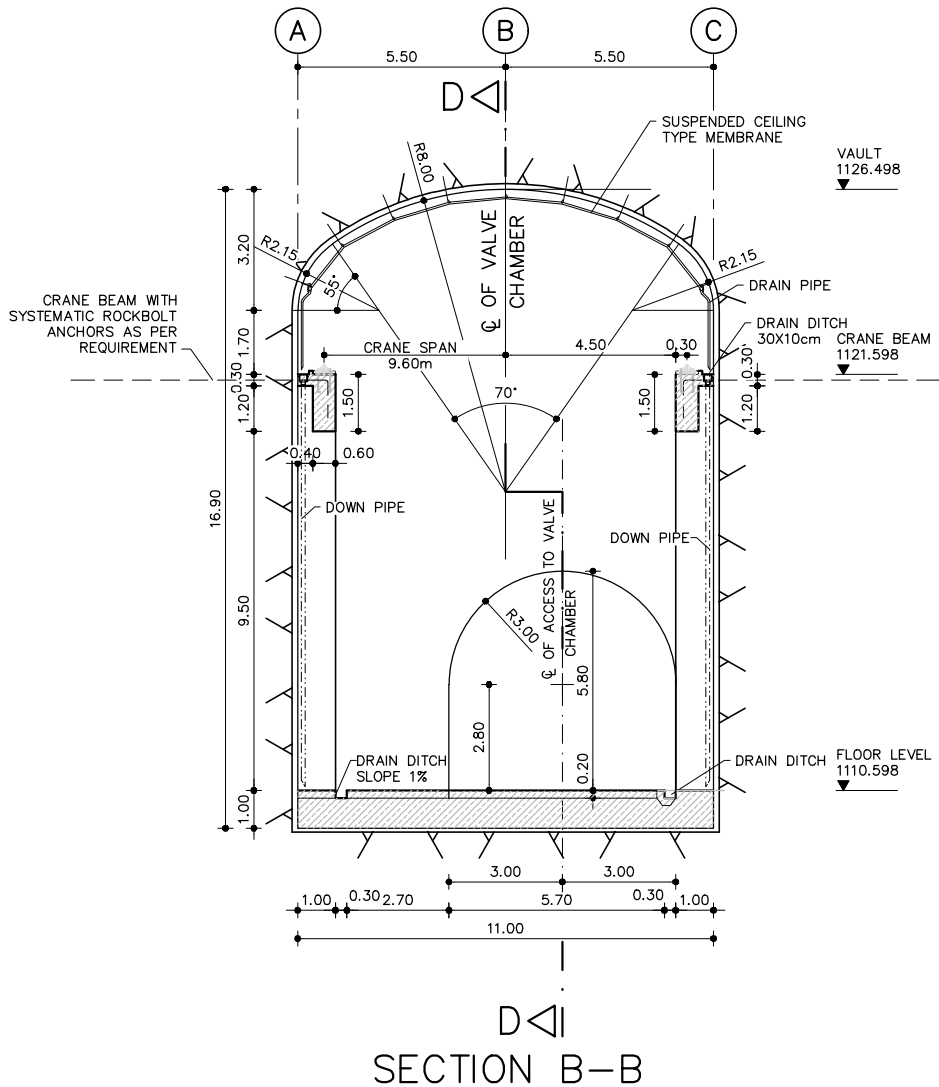
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

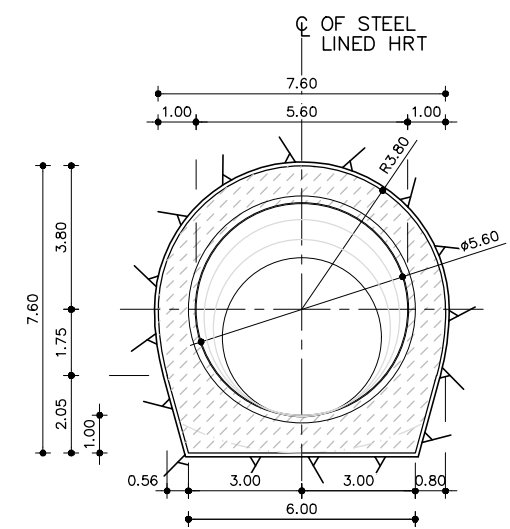
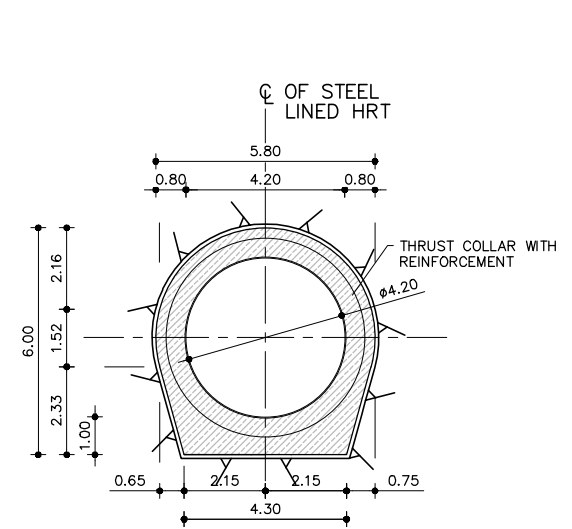
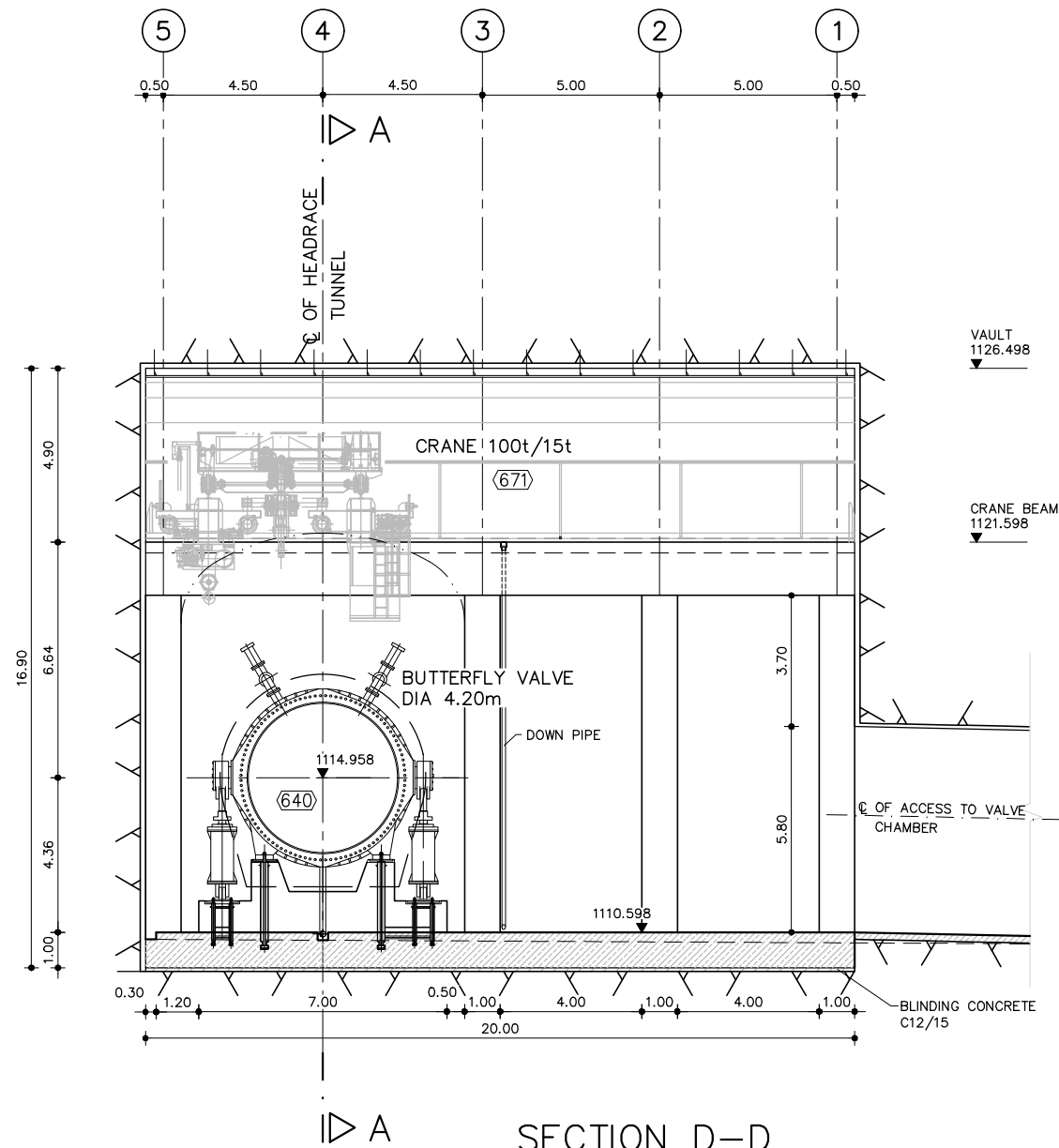


CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

	Name	Date	
Prepared	B. Khadka	31.07.17	DETAILED DESIGN
Drawn	B. Khadka		U/S VALVE CHAMBER
Checked	Roloff		VALVE CHAMBER
Approved	Dr. Moeller		CROSS SECTIONS B-B, C-C
Replaces Drwg. No: 31-00053-DD-4336-Y-0000_			
CAD- File No.:			
Scale A3: 1:200			PROJECT DRAWING
Drwg. No.: 31-00053-DD-4336-Q 1352			REV. -





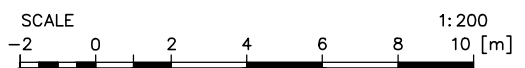
NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ROCK SUPPORT MEASURES NOT SHOWN.
- ROCK DRAINAGE SYSTEM WITH SYSTEMATIC DRAIN HOLES NOT SHOWN.


DRAFT STATUS:
06.10.2018

LEGEND:


- CONCRETE CLASS A – BACKFILL CONCRETE C20/25
- CONCRETE CLASS C1 – FIRST STAGE CONCRETE C25/30
- CONCRETE CLASS C2 – FIRST STAGE CONCRETE C30/37
- CONCRETE CLASS C1 – SECOND STAGE CONCRETE C25/30
- CONCRETE CLASS F – BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- CHEQUERED PLATES
- UNFINISHED TOP OF SLAB
- FINISHED FLOOR LEVEL
- FIXPOINT-COORDINATE
- NUMBER OF EL-ME EQUIPMENT REFER TO LIST OF EQUIPMENT
- ROOM NUMBER



Reference Drawings				
Drwg. No.		Title		
31-00053-DD-4336-Q-1350		US VALVE CHAMBER, LAYOUT, SECTIONS		
Revisions				
	Name	Date	Notes	



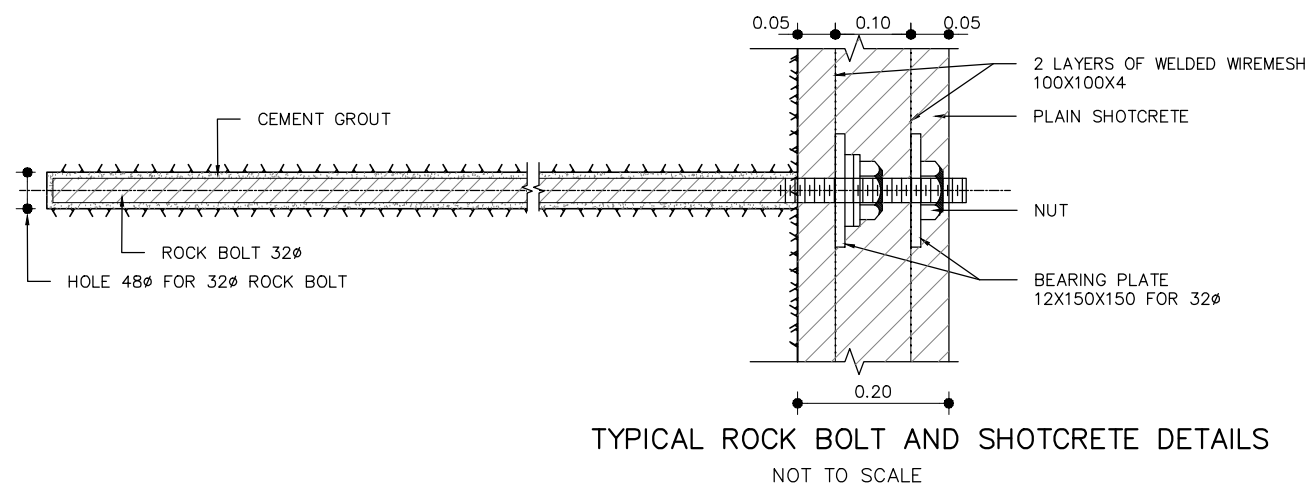
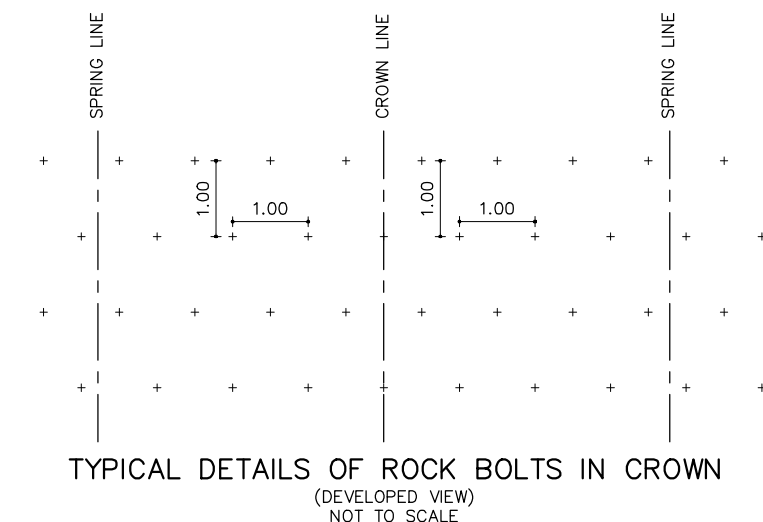
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

LAHMEYER
INTERNATIONAL

CONSULTING ENGINEERS
BAD VILBEL, GERMANY

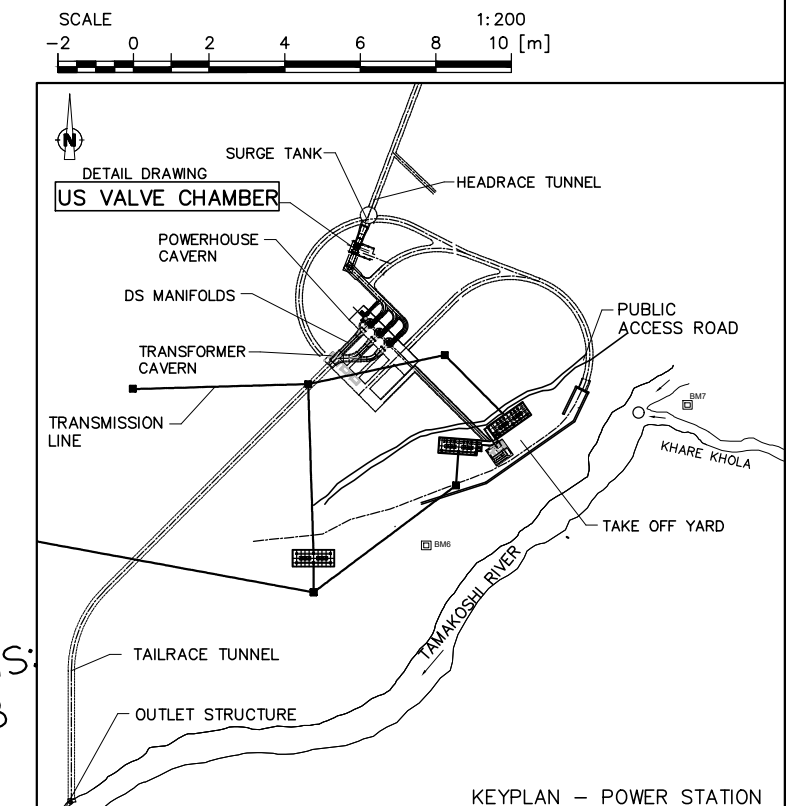
TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN <u>U/S VALVE CHAMBER</u> <u>VALVE CHAMBER</u> SECTIONS D, E AND F PROJECT DRAWING		
Prepared	B. Khadka	31.07.17			
Drawn	B. Khadka				
Checked	Roloff				
Approved	Dr. Moeller				
Replaces Drwg. No: 31-00053-DD-4336-Y-0000_					
CAD- File No.:					
Scale A3: 1:200			Drwg. No.: 31-00053-DD-4336-Q 1353	REV.	—



DRAFT STATUS:
21.09.2018

1. DRAIN HOLES SHALL BE DRILLED AFTER INSTALLATION OF BOLTS
2. DRAIN HOLES L=6.00 m, INCLINED 5°. DIA Ø76 mm
3. DRAIN HOLE SHALL BE EQUIPPED WITH SUITABLE FILTER PIPES (SLOTTED PVC PIPES WRAPPED WITH GEOTEXTILE)
4. PATTERN 9 m² (3.00 BY 3.00).
5. DRAIN HOLE PATTERN MAY BE ADJUSTED ON SITE TO SUIT WATER INFLOW FROM PARTICULARLY PERMEABLE ROCK STRATA. DRAIN HOLES IN THE CAVERN VAULT SHALL BE ALIGNED VERTICALLY, TO ALLOW FOR DIRECT CONNECTION OF VERTICAL COLLECTING PIPES.



Reference Drawings			
Drwg. No.		Title	
31-00053-DD-4336-1350...		US VALVE CHAMBER, LAYOUT, SECTIONS	
Revisions			
	Name	Date	Notes

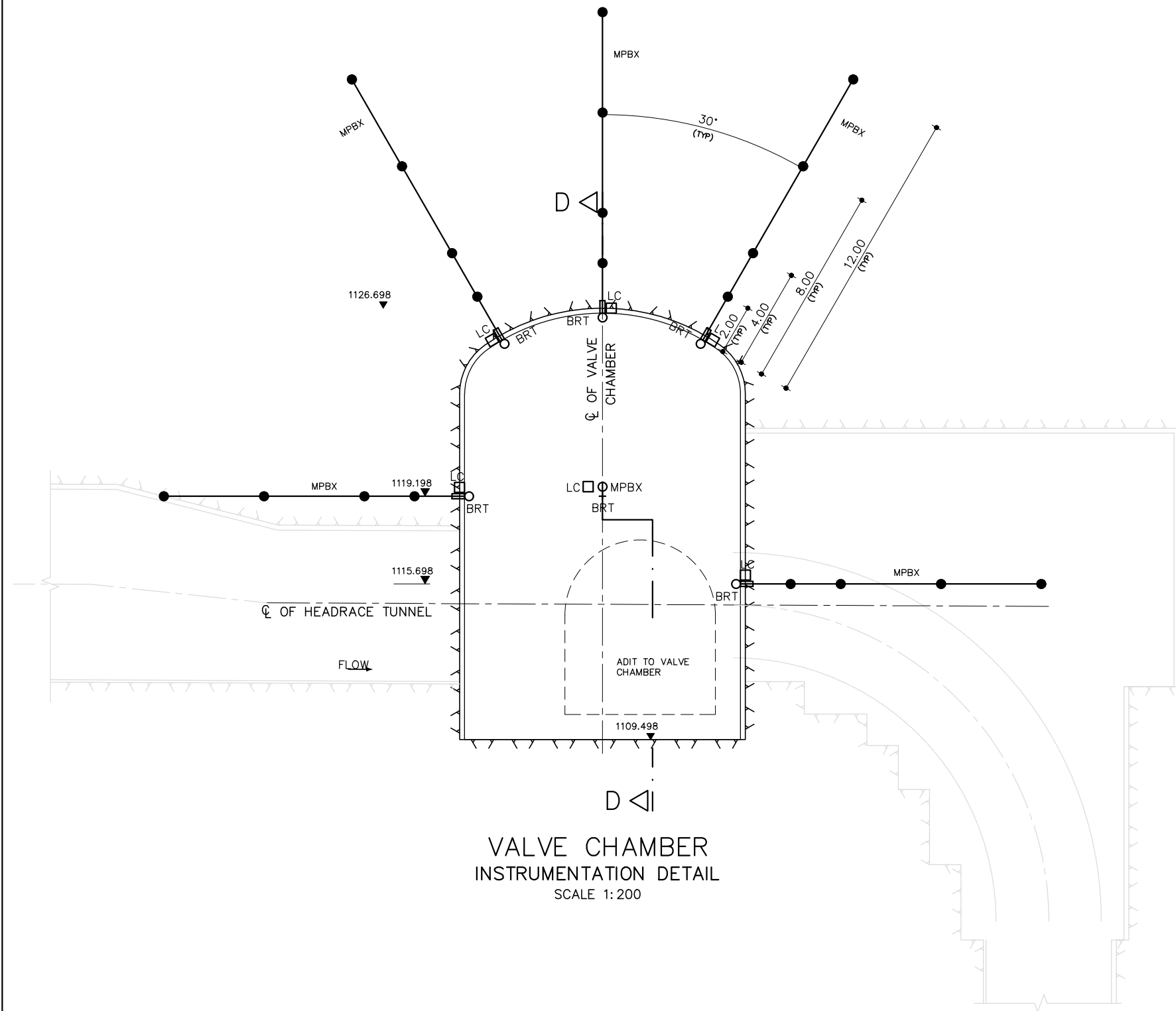
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



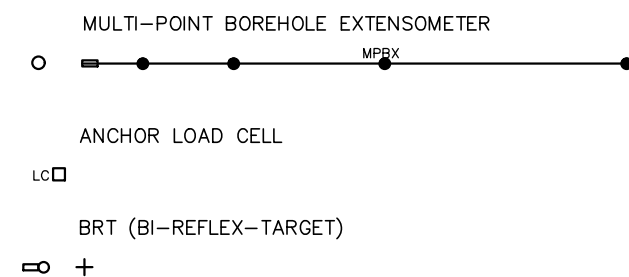
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN	
Prepared	R. Shrivastava	21.09.18	<u>U/S VALVE CHAMBER</u> <u>VALVE CHAMBER</u> EXCAVATION AND ROCK SUPPORT SHEET 1 OF 2 PROJECT DRAWING	
Drawn	A. K. Basu	21.09.18		
Checked	Roloff	21.09.18		
Approved	Dr. Moeller	21.09.18		
Replaces Drwg. No: 31-00053-DD-4336-Y-0000_—				
CAD— File No.:				
Scale A3: 1:200			Drwg. No.: 31-00053-DD-4336— S 1355 REV. —	



LEGEND:



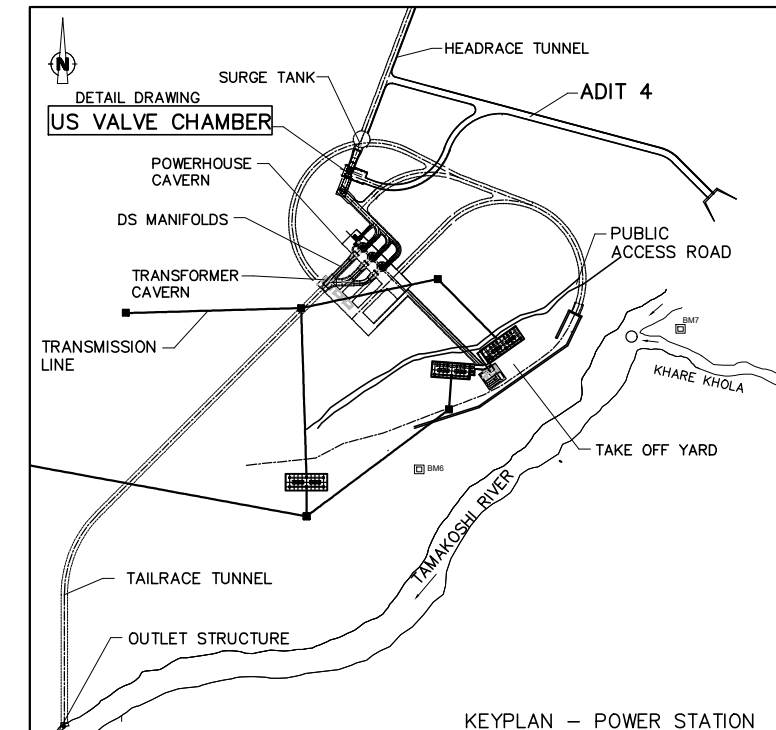
NOTES TO INSTRUMENTATION:

1. EACH EXTENSOMETER HEAD SHALL BE EQUIPPED WITH A GEODETIC SURVEY POINT.
2. TENDONS IF INSTALLED SHALL BE EQUIPPED WITH A LOAD CELL.
3. LOAD CELLS SHALL BE INSTALLED ON ANCHORS THAT ARE AT AS INDICATED OR NEAR THE MONITORING SECTIONS.
4. IF NICHES PROVIDED FOR EXTENSOMETER AT FACE WALLS THOSE SHALL BE EQUIPPED WITH A BEACON TO ALLOW GEODETIC SURVEY.
5. CONVERGENCY SECTIONS AT INTERSECTING TUNNELS SHALL BE LOCATED AT 2 m DISTANCE.

DRAFT STATUS:
25.09.2018

NOTES:

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CABLE FROM INDIVIDUAL INSTRUMENTS AT DIFFERENT LOCATIONS WILL BE CONNECTED TO SWITCH BOXES FOR OBSERVING DATA.
4. CABLES WILL BE PROVIDED IN CONDUITS AND PROTECTIVE COVER WILL BE PROVIDED FOR INSTRUMENTS.
5. INSTRUMENTS ARE PROPOSED AT TWO SECTIONS IN VALVE CHAMBER AND ONE SET OF INSTRUMENTS AT EACH GABLE END WALL.



Reference Drawings

Drwg. No.	Title
31-00053-DD-4336-1350...	US VALVE CHAMBER, LAYOUT, SECTIONS

Revisions	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared R. Shrivastava	05.09.18	UPSTREAM POWER
Drawn A. K. Basu	05.09.18	WATERWAYS
Checked Roloff	05.09.18	VALVE CHAMBER
Approved Dr. Moeller	05.09.18	INSTRUMENTATION DETAILS
Replaces Drwg. No:		PROJECT DRAWING
CAD- File No.:		
Scale A3: 1:200	Drwg. No.: 31-00053-DD-4336-	S 1357 REV. -

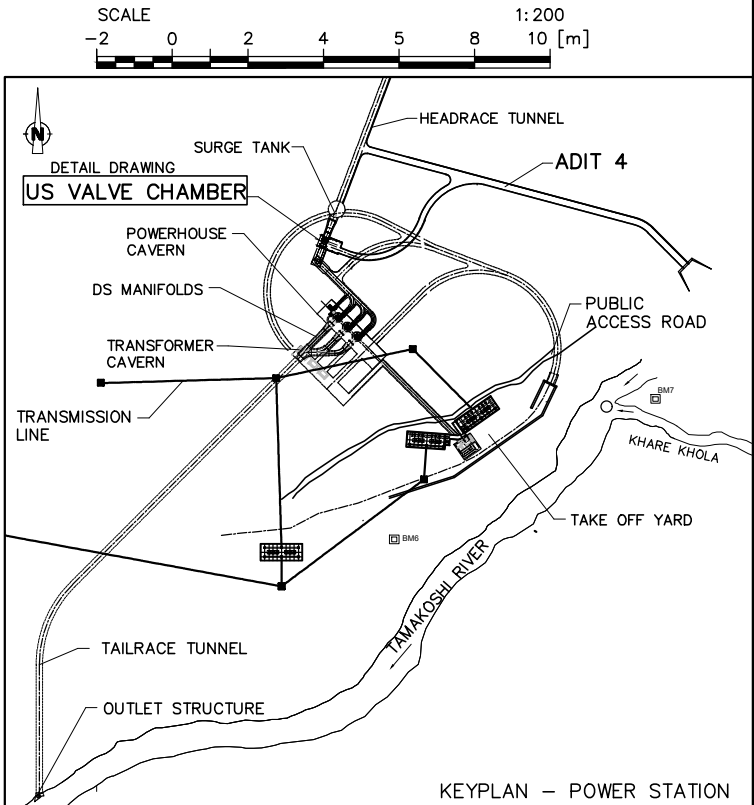




DRAFT STATUS:
25.09.2018

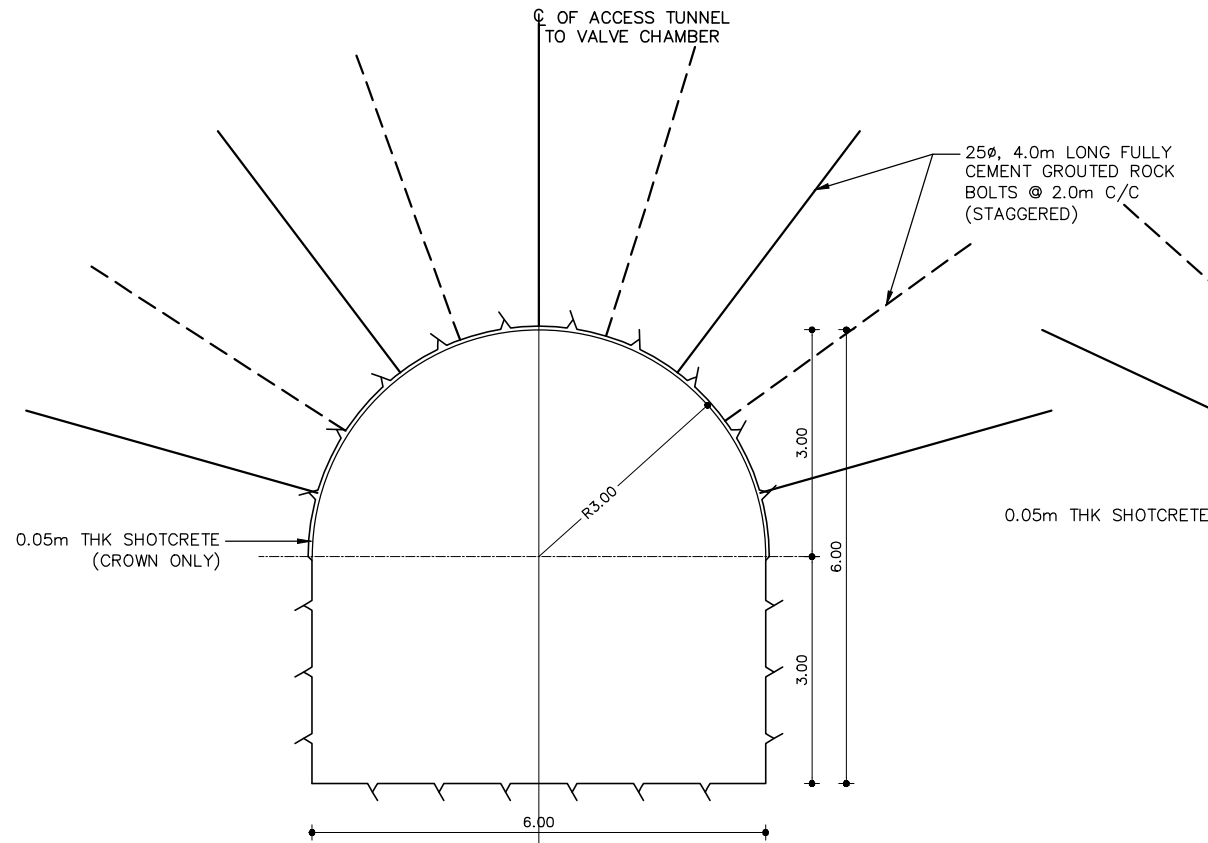
-
- MULTI-POINT BOREHOLE EXTENSOMETER
- O
- MPBX
- ANCHOR LOAD CELL
- LC
- BRT (BI-REFLEX-TARGET)

1. EACH EXTENSOMETER HEAD SHALL BE EQUIPPED WITH A GEODETIC SURVEY POINT.
2. TENDONS IF INSTALLED SHALL BE EQUIPPED WITH A LOAD CELL.
3. LOAD CELLS SHALL BE INSTALLED ON ANCHORS THAT ARE AT AS INDICATED OR NEAR THE MONITORING SECTIONS.
4. IF NICHES PROVIDED FOR EXTENSOMETER AT FACE WALLS THOSE SHALL BE EQUIPPED WITH A BEACON TO ALLOW GEODETIC SURVEY.
5. CONVERGENCY SECTIONS AT INTERSECTING TUNNELS SHALL BE LOCATED AT 2 m DISTANCE.

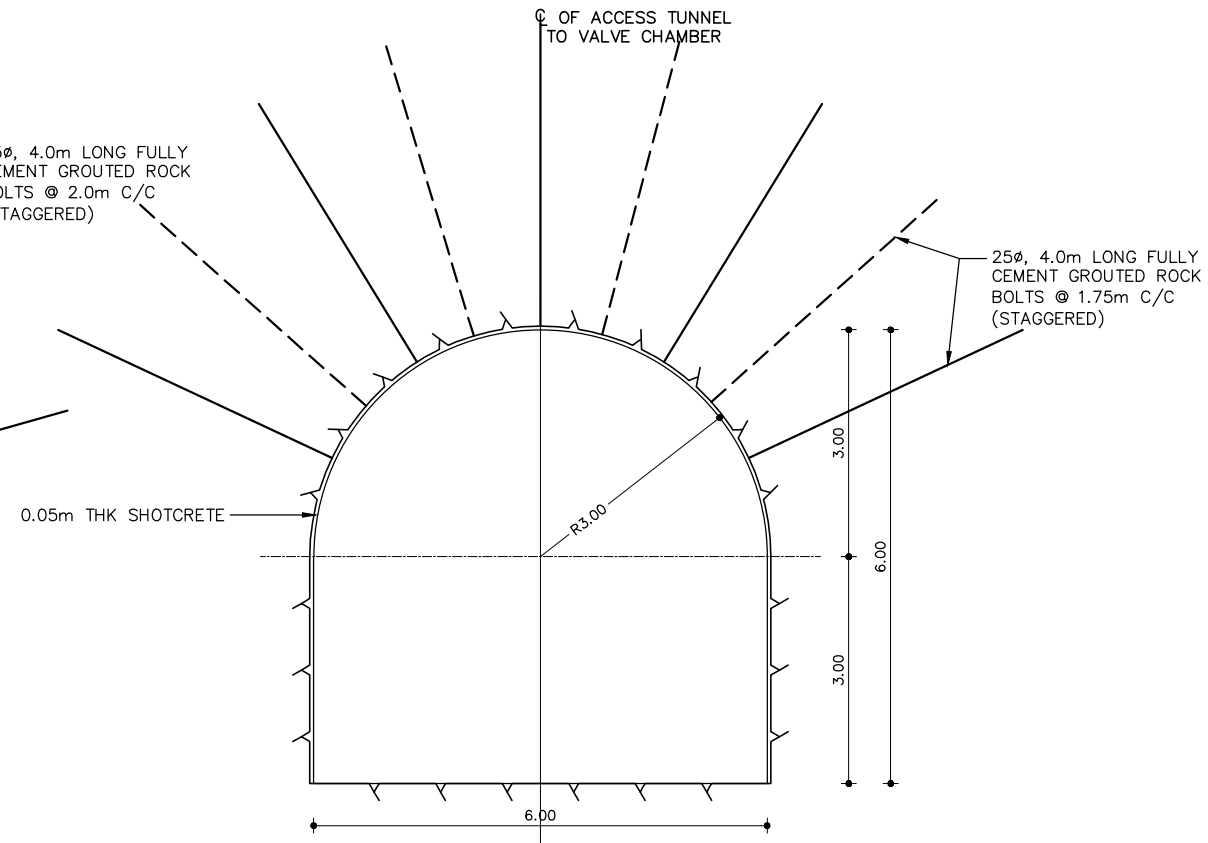
1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CABLE FROM INDIVIDUAL INSTRUMENTS AT DIFFERENT LOCATIONS WILL BE CONNECTED TO SWITCH BOXES FOR OBSERVING DATA.
4. CABLES WILL BE PROVIDED IN CONDUITS AND PROTECTIVE COVER WILL BE PROVIDED FOR INSTRUMENTS.
5. INSTRUMENTS ARE PROPOSED AT TWO SECTIONS IN VALVE CHAMBER AND ONE SET OF INSTRUMENTS AT EACH GABLE END WALL.



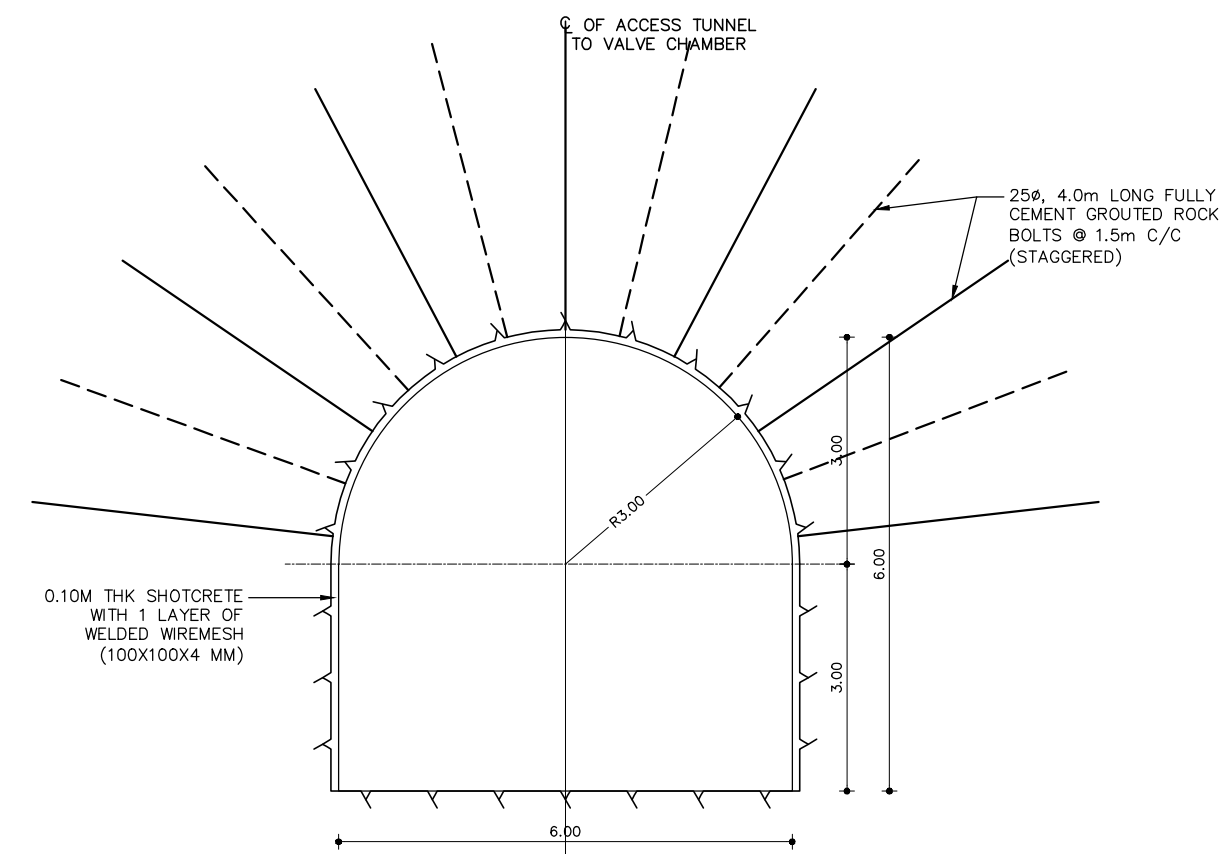
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Drwg. No.		Title	
31-00053-DD-4336-1350...		US VALVE CHAMBER, LAYOUT, SECTIONS	
Revisions			
	Name	Date	Notes
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>TAMAKOSHI V HYDROELECTRIC PROJECT PROJECT DEVELOPMENT DEPARTMENT ENGINEERING SERVICES DIRECTORATE NEPAL ELECTRICITY AUTHORITY</p> </div> <div style="text-align: center;">  <p>LAHMEYER INTERNATIONAL</p> </div> <div style="text-align: center;"> <p>CONSULTING ENGINEERS BAD VILBEL, GERMANY</p> </div> </div>			
TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN			
	Name	Date	DETAILED DESIGN <u>UPSTREAM POWER</u> <u>WATERWAYS</u> <u>VALVE CHAMBER, SECTION D-D</u> INSTRUMENTATION DETAILS PROJECT DRAWING
Prepared	R. Shrivastava	05.09.18	
Drawn	A. K. Basu	05.09.18	
Checked	Roloff	05.09.18	
Approved	Dr. Moeller	05.09.18	
Replaces Drwg. No:			
CAD- File No.:			
Scale A3: 1:200			Drwg. No.: 31-00053-DD-4336- S 1358
			REV. -



TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS II



TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS III



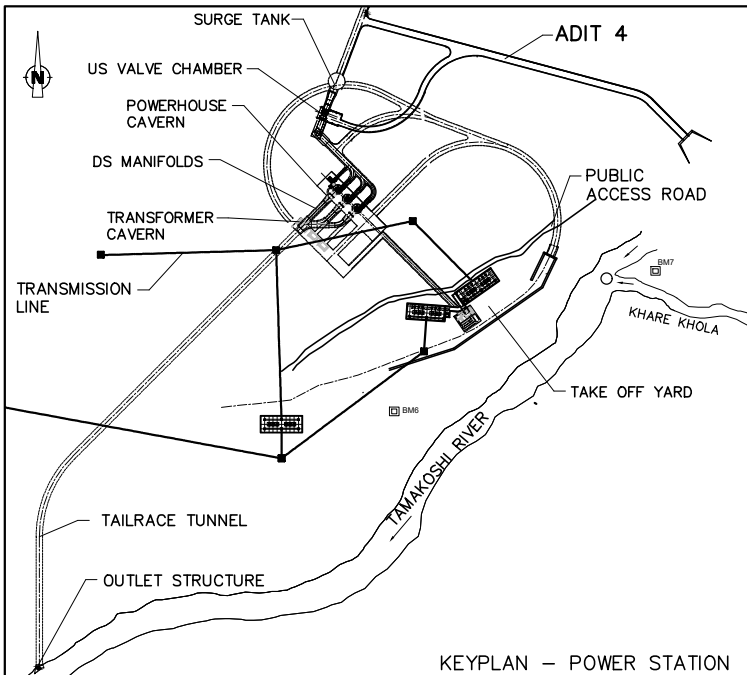
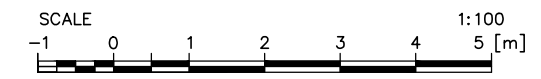
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS IV

NOTES TO ROCK SUPPORT:

- ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
- THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
- STEEL RIBS SHALL CONFORM TO IS:226-1975.
- AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
- CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
- BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
- IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
- DIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
- CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE


NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
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- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH IF ASSIGNED IT ACCORDING TO ROCK SUPPORT.




KEYPLAN - POWER STATION

Reference Drawings			
Drwg. No.	Title		
Revisions			
	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



LAHMEYER INTERNATIONAL

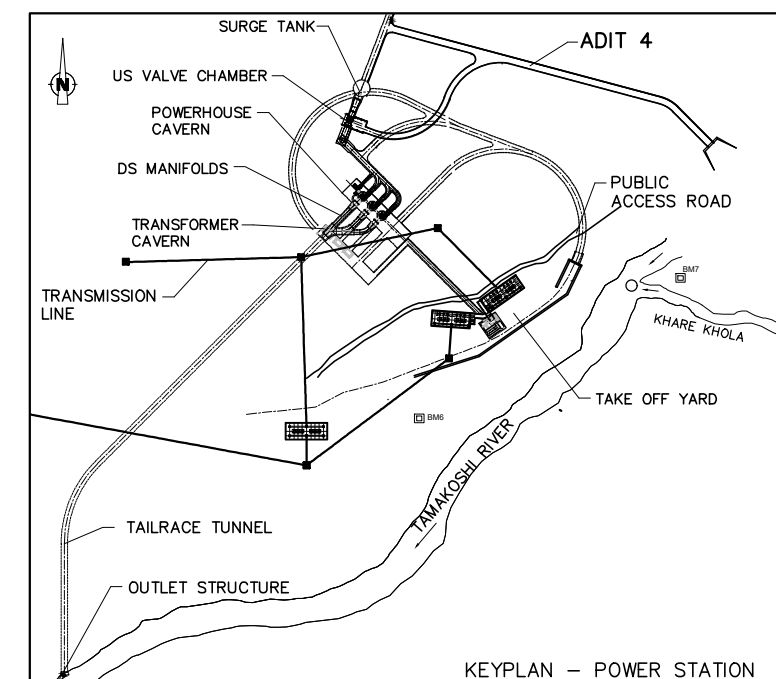
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN UPSTREAM VALVE CHAMBER ACCESS TO VALVE CHAMBER EXCAVATION AND ROCK SUPPORT (SHEET 1 OF 2) PROJECT DRAWING
Prepared	R. Shrivastava	04.09.18	
Drawn	A. K. Basu	04.09.18	
Checked	Roloff	04.09.18	
Approved	Dr. Moeller	04.09.18	
Replaces Drwg. No:			
CAD- File No.:			
Scale A3:	1:100	Drwg. No.: 31-00053-DD-4315- S 1365	REV. -




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4. ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH IF ASSIGNED IT ACCORDING TO ROCK SUPPORT.




- DIA. 25 MM
- YIELD STRENGTH 500 N/MM²
- MAXIMUM TENSILE CAPACITY 213 KN
2. THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
3. STEEL RIBS SHALL CONFORM TO IS: 226-1975.
4. AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
5. ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
6. THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
7. CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
8. BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
9. IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
10. DRIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
11. CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE



Reference Drawings				
Drwg. No.			Title	
Revisions				
Name			Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
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NEPAL ELECTRICITY AUTHORITY



LAHMEYER
INTERNATIONAL

CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT

DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN
Prepared	R. Shrivastava	04.09.18	<div style="font-size: 2em; font-weight: bold; margin: 0;">UPSTREAM VALVE</div> <div style="font-size: 2em; font-weight: bold; margin: 0;">CHAMBER</div> <div style="font-size: 1.2em; font-weight: bold; margin: 0;">ACCESS TO VALVE CHAMBER</div> <div style="font-size: 1.2em; font-weight: bold; margin: 0;">EXCAVATION AND ROCK</div> <div style="font-size: 1.2em; font-weight: bold; margin: 0;">SUPPORT (SHEET 2 OF 2)</div> <div style="font-size: 1.2em; font-weight: bold; margin: 0;">PROJECT DRAWING</div>
Drawn	A. K. Basu	04.09.18	
Checked	Roloff	04.09.18	
Approved	Dr. Moeller	04.09.18	
Replaces Drwg. No.: 31-00053-DD-4364-Y-0000_-			
CAD- File No.:			








Scale A3: 1:100

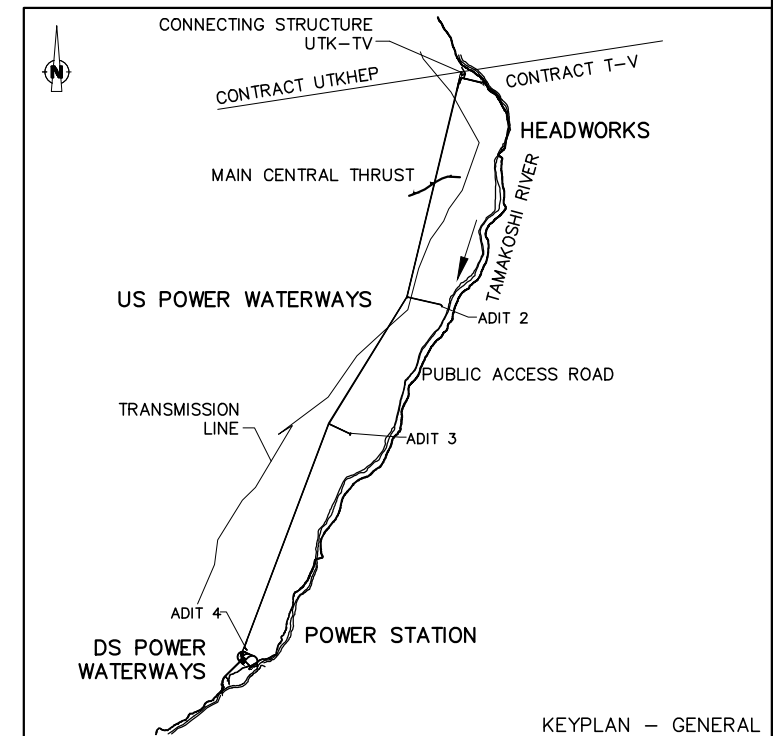
Drwg. No.: 31-00053-DD-4315- S 1365 REV.

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).



DRAFT STATUS:
16.10.2018



-  ELEVATION
 FIX POINT
 CONCRETE CLASS C1 – CONCRETE C25/30
 CONCRETE CLASS F – BLINDING CONCRETE C12/15
 CONSTRUCTION JOINTS
 UNFINISHED TOP OF SLAB
 FINISHED FLOOR LEVEL



Reference Drawings				
Dwg. No.			Title	
31-00053-DD-4315-Q-1360			UPSTREAM VALVE CHAMBER, ACCESS TUNNEL TO VC AND HRT	
Revisions				
	Name	Date	Notes	



		TAMAKOSHI V HYDROELECTRIC PROJECT PROJECT DEVELOPMENT DEPARTMENT ENGINEERING SERVICES DIRECTORATE NEPAL ELECTRICITY AUTHORITY															
 LAHMEYER INTERNATIONAL		CONSULTING ENGINEERS BAD VILBEL, GERMANY															
<p align="center">TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN</p>																	
<table border="1"> <thead> <tr> <th>Name</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Prepared B. Khadka</td> <td>21.01.18</td> </tr> <tr> <td>Drawn B. Khadka</td> <td></td> </tr> <tr> <td>Checked Roloff</td> <td></td> </tr> <tr> <td>Approved Dr. Moeller</td> <td></td> </tr> <tr> <td colspan="2">Replaces Drwg. No: ...</td> </tr> <tr> <td colspan="2">CAD- File No.:</td> </tr> </tbody> </table>		Name	Date	Prepared B. Khadka	21.01.18	Drawn B. Khadka		Checked Roloff		Approved Dr. Moeller		Replaces Drwg. No: ...		CAD- File No.:		DETAILED DESIGN <u>UPSTREAM VALVE</u> <u>CHAMBER</u> ACCESS TUNNEL TO VC AND HRT LONGITUDINAL SECTION PROJECT DRAWING	
Name	Date																
Prepared B. Khadka	21.01.18																
Drawn B. Khadka																	
Checked Roloff																	
Approved Dr. Moeller																	
Replaces Drwg. No: ...																	
CAD- File No.:																	
Scale A3: 1:1000		Drwg. No.: 31-00053-DD-4315 Q 1366 REV. —															

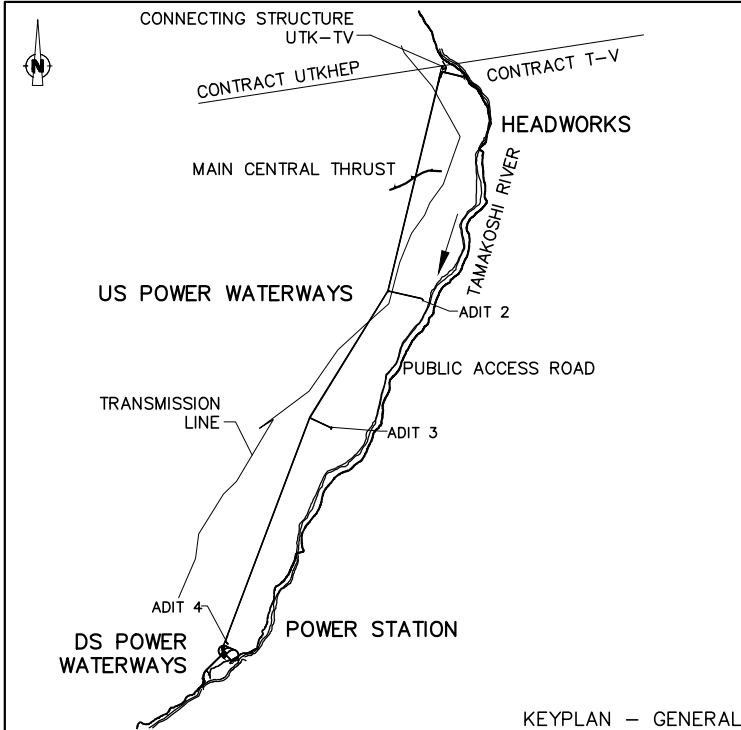
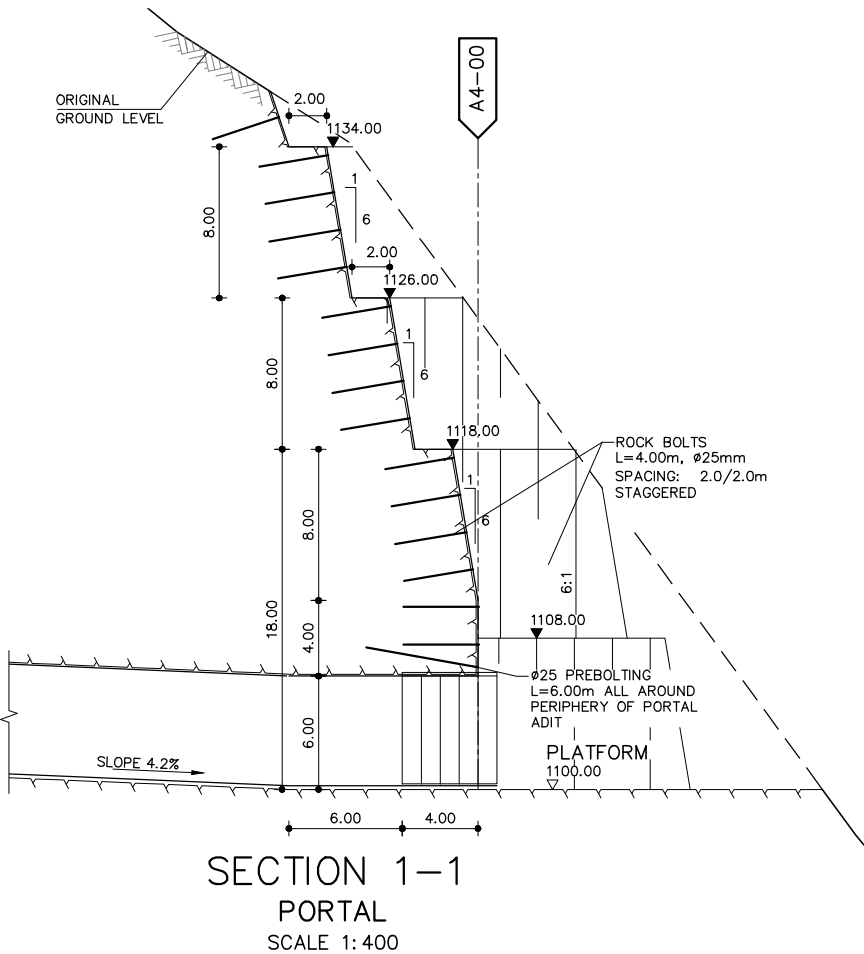
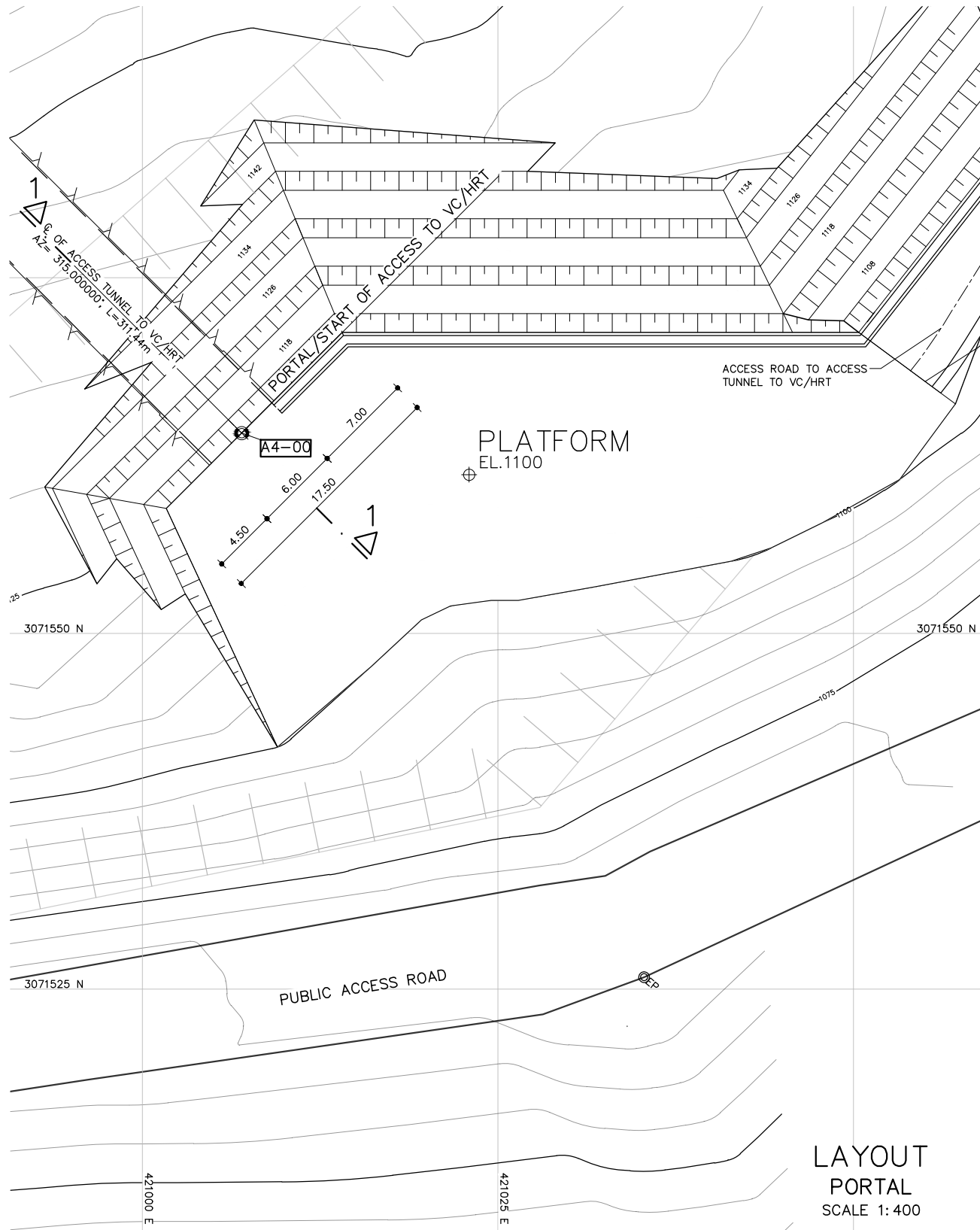
DRAFT STATUS:
16.10.2018


NOTES:

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).
4. TOPOGRAPHY ACCORDING TO DETAILED DESIGN.

LEGEND:

AZ	AZIMUTH [°]
	ELEVATION
	FIX POINT

[illegible]

 TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



LAHMEYER
INTERNATIONAL

CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT

DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN			
Prepared	B. Khadka	21.01.18	<u>UPSTREAM VALVE</u> <u>CHAMBER</u> ACCESS TUNNEL TO VC AND HRT PORTAL, LAYOUT AND SECTION PROJECT DRAWING			
Drawn	B. Khadka					
Checked	Roloff					
Approved	Dr. Moeller					
Replaces Drwg. No: ...						
CAD— File No.:						
Scale A3: 1:400			Drwg. No.: 31—00053—DD—4315	Q 1367	REV.	—

LEGEND:

BRT (BI-REFLEX-TARGET)

 $\odot +$

BOLTS

NOTES FOR INSTRUMENTATIONS:

DURING EXCAVATION:

CONVERGENCE:

1. CONVERGENCE SECTION SHALL BE PLACED AT SECTIONS WHERE ACC. TO THE ROCK-MASS CLASSIFICATION SYSTEM (Q-VALUES ARE LESS THAN 0.3 OR AT AREAS OF CONCERN (WITH HIGH INFLOW ZONES, LONG SECTIONS OF marginally poor rock masses, AT ADJACENT FAULT ZONES, AT INTERSECTION AREAS ETC.);
2. DISTANCE BETWEEN CONVERGENCE SECTION FOR AREAS WITH $0.1 < Q\text{-VALUE} < 0.3$ SHALL BE LIMITED TO 15M, AT AREAS WITH $Q\text{-VALUE} < 0.1$ DISTANCE TO 6M;
3. ADDITIONAL CONVERGENCE SECTION MAY BE ADDED ON THE DISCRETION OF THE ENGINEER;
4. CONVERGENCE SECTION SHALL CONSIST OF 4 POINTS TRAPEZOIDAL ARRANGED;
5. MEASUREMENT SHALL FOLLOW A FREQUENCY PATTERN SUCH AS
 - DAILY MEASUREMENTS SHALL BE TAKEN FOR FIRST 20 DAYS OR UNTIL THE EXCAVATION FACE GETS FARTHER THAN 15M FROM THE SECTION;
 - FOLLOWING WITH WEEKLY MEASUREMENTS OR UNTIL THE EXCAVATION FACE GETS FARTHER THAN 75M FROM THE SECTION. THEREAFTER, MEASUREMENTS SHALL BE EVALUATED AND IN CASE OF NO FLUCTUATION OR CONVERGENCE, MEASUREMENTS MAY ON MONTHLY BASIS.

EXTENSOMETER:

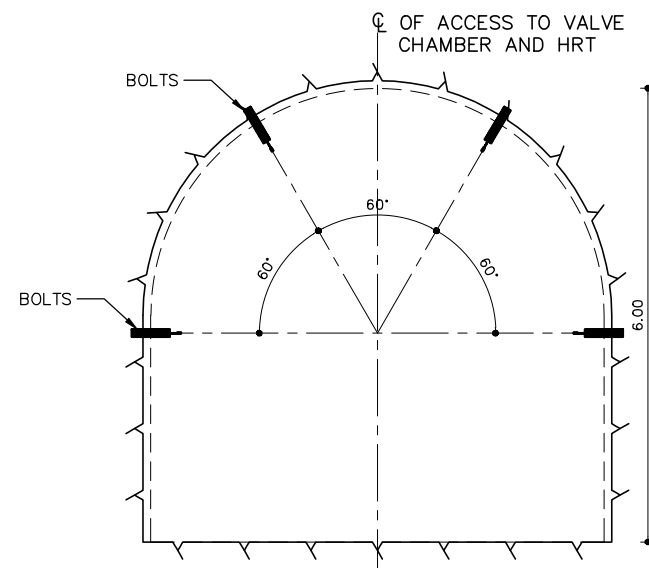
1. SHALL BE INSTALLED AND MAINTAIN AT SECTIONS WITH Q-VALUE <0.3 AND AT AREAS OF POSSIBLE CONCERN OR AS DIRECTED BY THE ENGINEER.
2. MAXIMUM SPACING BETWEEN CONVERGENCE SECTION SHOULD NOT EXCEED 200 M AND MAXIMUM SPACING BETWEEN EXTENSOMETERS SHOULD NOT EXCEED 300 M.

PERMANENT OR AFTER COMPLETION:

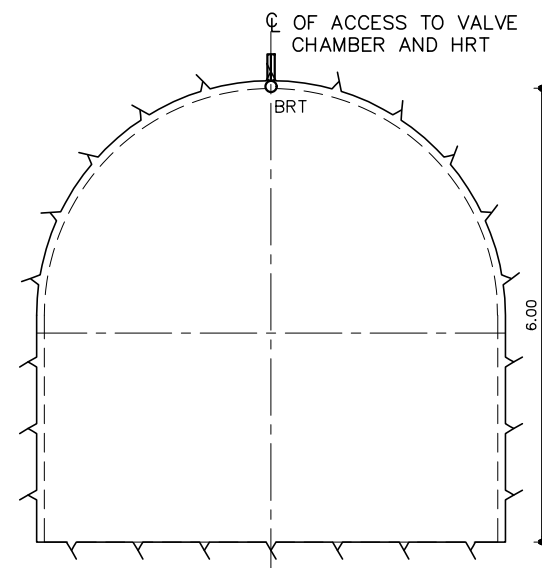
1. LOCATION OF PERMANENT MONITORING SECTIONS SHALL BE INSTALLED ONLY AT AREA OF CONCERN (WITH HIGH INFLOW ZONES, LONG SECTIONS OF marginally poor rock masses, AT ADJACENT FAULT ZONES, AT INTERSECTION AREAS ETC.);
2. MONITORING SECTION SHALL CONSIST OF REMOTE MONITORING DEVICES FOR MPBX EXTENSOMETER, LOAD CELL AND IF REQUIRED WIRE PIEZOMETER;
3. CABLE IN SLEEVE PIPES PROVIDED FROM INDIVIDUAL INSTRUMENTS AT DIFFERENT LOCATIONS WILL BE CONNECTED TO SWITCH BOXES FOR OBSERVING DATA AND ROUTED TO READING POINTS WHICH SHALL BE NEARBY AT AN ACCESSIBLE PLACE.

NOTES:

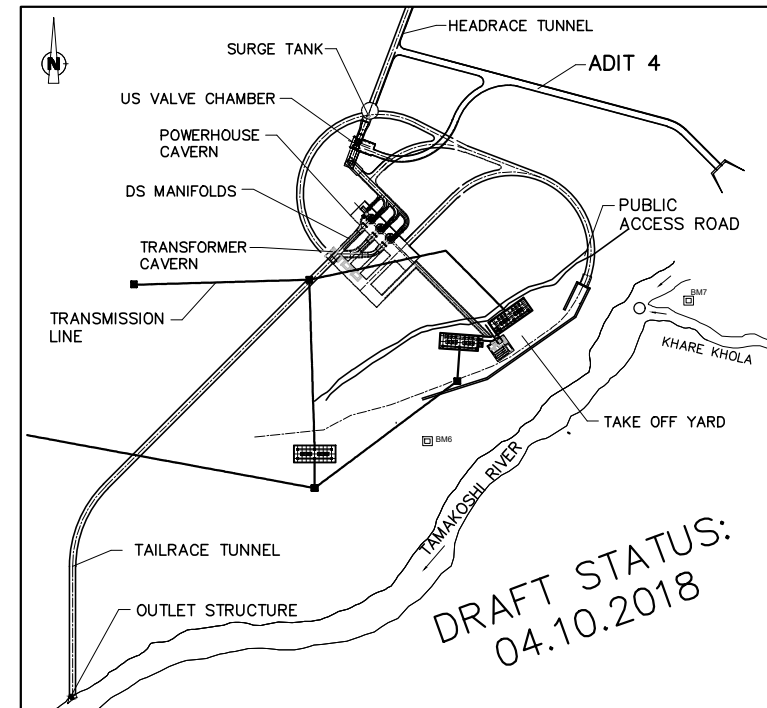
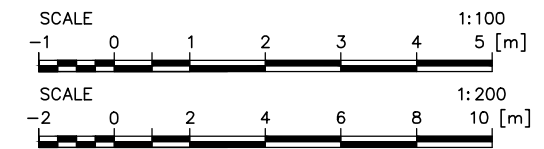
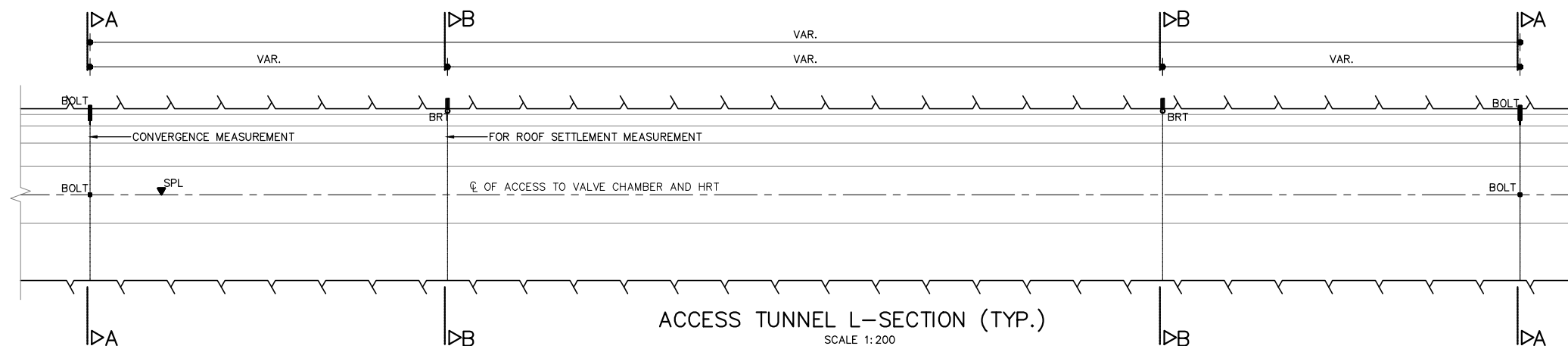
1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CABLE FROM INDIVIDUAL INSTRUMENTS AT DIFFERENT LOCATIONS WILL BE CONNECTED TO SWITCH BOXES FOR OBSERVING DATA.
4. CABLES WILL BE PROVIDED IN CONDUITS AND PROTECTIVE COVER WILL BE PROVIDED FOR INSTRUMENTS.



SECTION A-A
4 POINT CONVERGENCE ARRAY (TYP.)
(FOR CONVERGENCE MEASUREMENT)
SCALE 1:100



SECTION B-B
1 POINT ROOF SETTLEMENT POINT (TYP.)
(FOR ROOF SETTLEMENT MEASUREMENT)
SCALE 1:100



Reference Drawings					
Drwg. No.			Title		
31-00053-DD-4336-1350...			US VALVE CHAMBER, LAYOUT, SECTIONS		
Revisions					
	Name	Date	Notes		



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BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT

DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN <u>UPSTREAM VALVE</u> <u>CHAMBER</u> ACCESS TO VC AND HRT (ADIT 4) INSTRUMENTATION DETAILS PROJECT DRAWING
Prepared	R. Shrivastava	04.10.18	
Drawn	A. K. Basu	04.10.18	
Checked	Roloff	04.10.18	
Approved	Dr. Moeller	04.10.18	
Replaces Drwg. No:			
CAD- File No.:			
Scale A3: 1:100, 1:200			
Drwg. No.: 31-00053-DD-4315- S 1369			REV.